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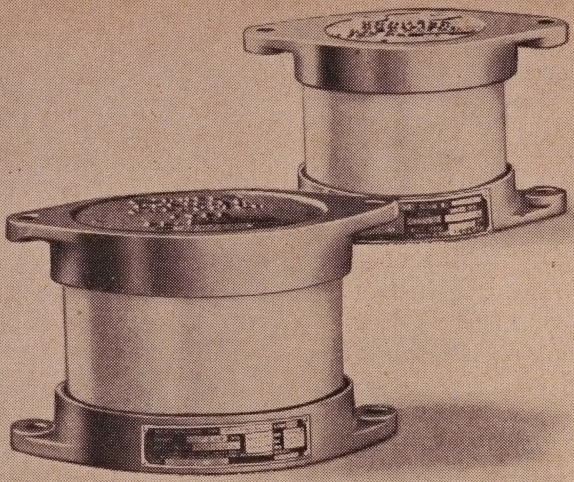

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A BROADCAST-BAND GRID DIP OSCILLATOR

A large number of articles describing the construction and operation of grid dip oscillators have appeared in the popular radio magazines in recent months. Most of these instruments have been designed expressly for the transmitting radio amateur and short-wave experimenter and, as a result, have emphasized high-frequency operation. The Editors of the C-D CAPACITOR have received a considerable number of requests from radio service technicians for constructional details of a broadcast-band grid dip oscillator. An instrument of this type may be used in checking radio receiver circuits, components, and operation. This article describes a practical broadcast-band grid dip oscillator which may be constructed within a few hours. It is inexpensive and uses standard components.

Instrument Arrangement

Figure 1 shows the completed grid dip oscillator. Figure 2 gives the circuit diagram.

The instrument is built into a metal radio utility box, 6" high, 4" wide, and 5" deep and has self-contained power supply. There are only two adjustable controls — the main tuning dial and the sensitivity control potentiometer. These controls are standard on all grid dip oscillators and their use is well understood. The sensitivity control (R_1 in Figure 2) is

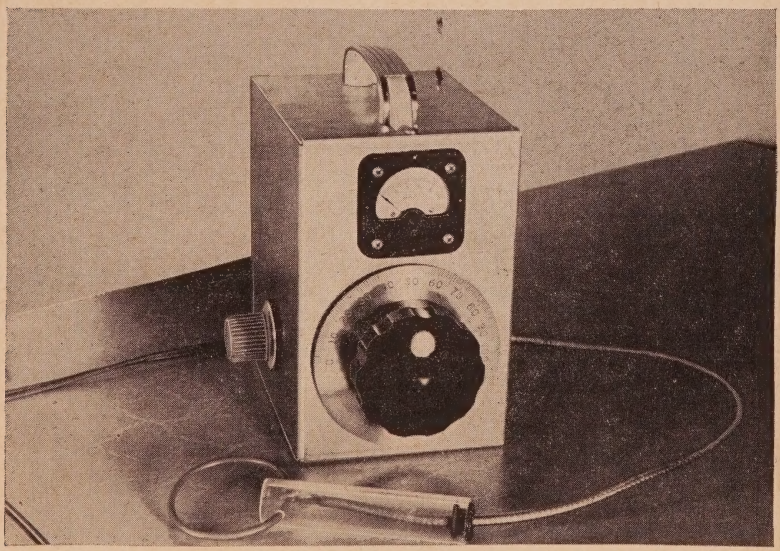


Fig. 1

adjusted by means of the small knob seen on the left side of the box in Figure 1. Resonance is indicated by the miniature 1½-inch 0-100 d. c. microammeter (M). The entire instrument has been arranged for small size, light weight, and easy handling.

An external, single-turn loop probe has been provided for inductive coupling to circuits or components under test. This probe is seen directly ahead of the instrument in Figure 1. This is an added convenience, since coupling the actual oscillator coil to the circuit under measurement is not always practicable.

The oscillator uses a simple series-fed Hartley circuit with a 6C4 triode. The single-section, straight-line-frequency 365-uufd. midget broadcast-type variable capacitor, C_1, tunes the oscillator approximately from 510 to 1800 kc. Sensitivity of the instrument is adjustable by means of the 1000-ohm wirewound potentiometer, R_1, which functions as a shunt for the grid microammeter, M.

The power supply is self-contained. For simplicity and freedom from severe heating, a selenium rectifier (SE) is employed. Note, however, that this is not an ac-dc type of power supply. For maximum safety to the operator, transformer coupling is used to prevent electric shock. Two midget 6.3-volt filament transformers are connected back-to-back to provide 115 volts with complete power-line isolation. This is the most inexpensive isolating transformer arrangement. Commercial 1:1 transformers are both bulky and costly. The 6C4 heater is operated from the 6.3-volt section of the transformer circuit. The ON-OFF power switch is integral with the sensitivity control potentiometer, R_1. A 25-ohm peak-limiting resistor, R_3, protects the selenium rectifier from damage due to high peak currents. A 1200-ohm resistor, R_4, and the dual electrolytic capacitor, C_5-C_6, serve as the power supply filter. Resistor R_4 acts also as a current-limiting resistor for the VR-105 voltage regulator tube. The regulator stabilizes the oscillator frequency by holding the plate voltage constant. This voltage regulation feature should not be omitted by the reader.

Mechanical Construction

No chassis is employed. All parts are bolted directly to the bottom and sides of the collapsible metal box which serves as the instrument case. Circuit ground connections are made to the box, as indicated in Figure 2. However, no part of the power line should be permitted to come into contact with the box.

A 3½"-diameter National Type O dial, with large grid knob, is shown in Figure 1. This dial may be provided with a special direct-reading paper or Bristol board scale graduated in megacycles, if desired, or the dial may be used as shown without alteration, its readings being referred to a calibration curve. Calibration procedure is explained later in this article.

Coils L_1 and L_3 are wound on the same 1-inch-diameter bakelite or polystyrene tube. Coil winding data are given in the caption of Figure 2. This coil assembly must be mounted rigidly on the tuning capacitor frame to provide short leads.

The selenium rectifier must be mounted away from the oscillator tube, in order to prevent the former from being affected by the tube heat.

The coupling probe consists of a 2-inch-diameter single turn of No. 12 insulated copper wire attached to one end of a length of ½-inch-diameter polystyrene tubing employed as the probe handle. The coupling turn is shown as L_2 in Figure 2. L_2 is connected to a 2-foot length of RG-29/U small-diameter coaxial cable. In Figure 1, this cable may be seen passing through a tight-fitting rubber grommet in one end of the polystyrene-tube handle. On the other end of the cable is a Type RG-88/U male coaxial plug. The latter inserts into an RG-290/U female socket mounted on the right

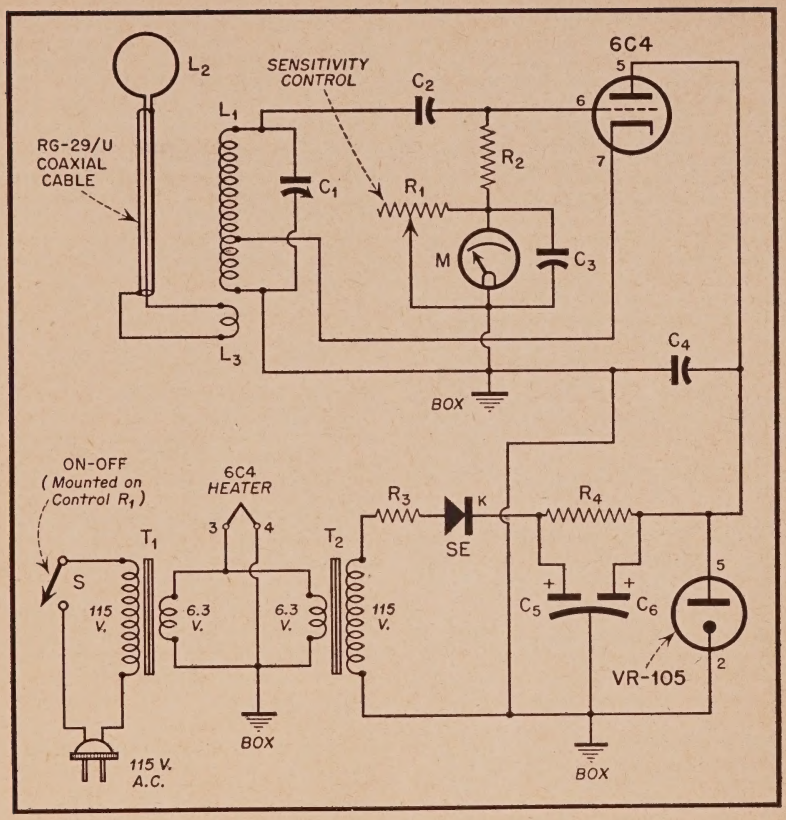


Fig. 2

side of the instrument box. This plug-in feature allows the probe to be disconnected easily and quickly when the instrument is stored or transported. Separate plug-in probes with larger or smaller single-turn coupling coils may be constructed, if desired, for more convenient coupling to larger or smaller coils under test. The coil-and-cable assembly of the probe shown here (2-inch No. 12 coupling ring and 2-foot cable) has a self-resonant frequency of approximately 63 megacycles. This frequency is sufficiently removed from the broadcast band to cause no resonance difficulties during normal operation of the instrument.

The carrying handle seen mounted on top of the box in Figure 1 is a standard "dime-store" drawer pull. Small rubber feet are attached to the back and bottom of the instrument case to prevent scratching of the table on which the device is placed.

While a specific type of midget construction is indicated for the instrument shown here, the reader is not restricted to this design but may exercise his own ingenuity. The instrument is not critical in operation and lends itself well to almost any desired mechanical layout.

Calibration

The grid dip oscillator may be calibrated accurately enough for all practical purposes by beating with broadcast station carriers. As many stations as practicable are tuned-in successively on a broadcast receiver, and the grid dip oscillator set to zero beat with each carrier. The more check points employed, the more accurate will be the tuning curve plotted for the main dial of the instrument. Allow the instrument to heat up for at least one (1) hour before undertaking calibration.

Since the grid dip oscillator emits a fairly strong signal, a satisfactory degree of coupling may be obtained simply by resting the 1-turn coupling coil of the oscillator near the receiver. In order to prevent errors due to accidental use of harmonics, it is advisable to begin the calibration by tuning-in the lowest-frequency broadcast station available (near the 500-kc. end of the band). Then, progress to each higher-frequency station until each desired carrier in the band has been used as a check point.

If a 100-kc. frequency standard is available, it may be employed in lieu of broadcast carriers, usually with a larger number of spot-frequency check points. Connect the frequency standard output to the antenna and ground input terminals of the broadcast receiver. Couple-in the grid dip oscillator by resting the 1-turn probe coil near the antenna end of the receiver. Set the receiver to the lowest-frequency harmonic point of the 100-kc. standard. This possibly will be 600 kc. Set the grid dip oscillator to zero beat with this check point. Record the corresponding dial setting. Set the receiver to the next highest harmonic and set the oscillator to zero beat with this check point. Repeat the procedure at each 100-kc. point throughout the tuning range of the grid dip oscillator.

After the checking procedure has been completed, a calibration curve may be drawn in which dial settings are plotted against frequency, or a special direct-reading frequency card may be prepared and cemented to the dial face.

LIST OF COMPONENTS

C_1—365 uufd. straight-line-frequency midget variable

C_2, C_3—100 uufd. mica or ceramic (C-D 5RT1 or 2R5T1 or 6TM-5T1A)

C_4—0.01 ufd. 400 v. tubular (C-D PTE4S1 or TV4S1)

C_5, C_6—Dual 10 ufd. 450 d. c. w. v. (C-D BRD1145A)

L_1—165 turns No. 29 enamelled wire closewound on a 1-inch-diameter polystyrene or low-loss bakelite tube. Tap 55th turn.

L_2—2-inch-diameter single turn of No. 12 insulated copper wire

L_3—2 turns No. 22 d. c. c. wire closewound on same tube as L_1 and spaced ¼ inch from ground end of L_1

M—Midget (1½-inch) 0-100 d. c. microammeter (internal resistance 1110 ohms)

R_1—1000-ohm wirewound potentiometer

R_2—50,000 ohms 1 watt carbon

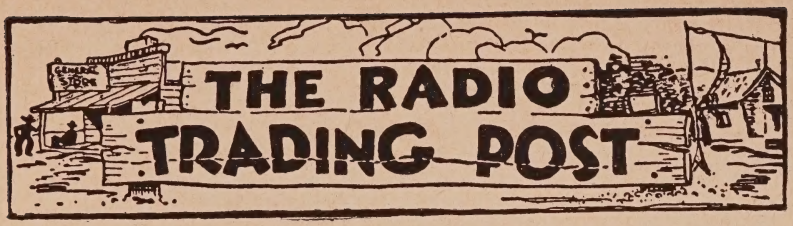
R_3—25 ohms 2 watts carbon

R_4—1200 ohms 1 watt carbon

S—S. p. s. t. switch mounted on potentiometer R_1

SE—75-milliampere selenium rectifier

T_1, T_2—Midget 6.3-volt 1-ampere filament transformers



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FOR SALE—VTVM, VOM, signal tracer, tube tester, tubes, etc. Send for free list. Hamilton Radio Service, Spirit Lake, Iowa.

FOR SALE—Hickok model 203 VTVM, perfect; Meissner 8C FM tuner, excellent; Garrard 201-V transcription turntable, good. Cash only, make offer. Michael Landis, 29 West 12th St., New York 11, N. Y.

FOR SALE—One pair sound powered phones, hand type, excellent cond., $5 for the pair. Roy M. Lustenader, 48 Edgecomb St., Albany, N. Y.

WANTED—A good 12" PM speaker, Altec, W.E., or similar. V. R. Parker, P.O. Box 88, Fitchburg, Mass.

SWAP—Rapid-rectigraphic lens, f8, 11, 17, 23" F.L., in shutter. Want flash gun, Kalart Master or similar. D. F. Moffett, 107 Quincy St., Clarksburg 6, W. Va.

FOR SALE—Webster Chicago model 178 wire recorder, 1 mo. old, meter type indicator, carrying case, extra new recording head, 2 w/c xtal mikes, 1 extension cord, mike stand, 2 half hour, one hour spools wire, $114. C. Adler, 5648 Canal Blvd., New Orleans, La.

FOR SALE—Boonton Q Meter, model 160A price $400. Clyde O. Reeves, 1812 Stine Rd., Kansas City, Kansas.

FOR SALE—Rider Manuals 1 to 14, like new; Precision 900-A tube and set tester; E-200 sig. tester, seldom used, with complete instructions. Sold only as a complete unit, $240. Stanley Galaski, 223 - 54th St., Brooklyn 20, N. Y.

FOR SALE—NRI Communications Course with 9 kits (less soldering iron), 5 Philco books, and other NRI books, $75 cash. T. J. Englert, 1601 France St., New Orleans, La.

WANTED—FM Tuners including cabinet in good working condition — G.E. Meissner, Pilotuner or Howard. Will pay up to $25. Submit complete details. P. S. Carter, 50 Quincy St., Sharon, Mass.

WANTED—ARC 5 Command transmitter 7- 9.1 Mc., new or used, in good cond. Will swap Mallory Vibrapack 346 R, (350V - 150Ma) less vibrator. George A. Siragusa, 3015 Roberts Ave., Bronx 61, N. Y.

FOR SALE—425' of RG8U and Rg11U coax cable in lengths from 40 to 65 feet. Some new, some slightly used in good condition. All for 8 cents a ft. Short lengths 10 cents ft. Neckers and Larson, Sherman, N. Y.

WANTED—Short wave receiver, such as Hallicrafter, National, etc. Send description. H. Latko, 1922 Dickens, Chicago, Ill.

TRADE—G.E. 10" TV in working cond. for tape or wire recorder. Norman Wilkes, 80-36 Langdale St., New Hyde Park, L. I. (N.Y.C. area only.)

FOR SALE—Radio and TV tubes, 6T8, 6AU6, etc., $1 postpaid. Also resistors, condensers, and various parts. Discontinued business. Send card for list. Ben Marconi, 120 Gatling Pl., Brooklyn 9, N. Y.

FOR SALE—Two RCA 833-A's used only few hours w. Johnson socket, $60 for lot; 25 mfd., 2,500 W.V.D.C. photoflash capacitors, $10 ea.; Superior powerstats type 116U, 115 V., 1 KVA., 216U, 230 V., 810 VA., $12 ea.; 805's and 872-A's, $3.50 ea. w. socket. All above like new, f.o.b. N. Y. C. Arthur Koehler, 130 Wadsworth Ave., New York 33, N. Y.

SWAP—Model 1917 Enfield 30-06 rifle, excellent condition except stock, with 30 commercial and 50 service cartridges. Want SX25, SX28, or equivalent rec. with or without speaker, or other ham gear. P. J. Lombard, Jr., Winnebago, Nebraska.

FOR SALE—Bendix TA-2J-24, 100W aircraft trans., $30; BC-312-E rec., less 110V supply, $40; Solar CB-160 condenser checker, $20; Superior 450 tube tester, $20; Navy TBX-2 trans. rec., $20; SCR-274-N components; good condition with tubes and manuals. W. Schwan; 191 West 1st St., Corning, N. Y.

FOR SALE OR TRADE—Supreme 85-PL tube tester; Franklin H-33 tube tester. Both good condition, both $35. Or typewriter, 8-10 watt amp., or good SW rec. Stubb's 140 S. 4th St., Reading, Pa.

FOR SALE—Two Jensen model PLJ 18" speakers, voice coil impedance 16 ohms, permanent magnet field, $55 ea. express collect. Donlad Keiser, Gladbrook, Iowa.

FOR SALE—Table model cabinet for Magnavox 17G with RCA 16AP4 metal tube, less chassis, perfect, $30; RCA latest 78 record player, pre-war, $5. Sam N. Narefsky, 4031 48th St., L. I. C. 4, New York.

SELL OR TRADE—100 watt push-pull 807 trans. modulated with P.P. 807's. Can be converted to higher power by changing tube in final. Also have Arnold model 0 Enlarger. Want service equip. Arthur Rieders, 1804 Harrison Ave., Bronx 53, N. Y.

FOR SALE—Variety of vacuum tubes, condensers, resistors, etc., going out of radio business. W. W. Douglass, Box 113, Parrish, Fla.

SELL—Back issues Radio Electronics (Radio Craft), Apr., '48, to Oct., '49, nearly perfect condition, $4. Also have Radio News, send for list. E. Erickson, Gross Lane, South River, N. J.

FOR SALE OR TRADE—Grunow 7 tube radio, tube tester, negative enlarger, old radio magazines. Need typewriter. Bill Cox, Box 417, Caraway, Ark.

FOR SALE—Transvision sweep sig. gen.; G.E. model CRO-3A oscilloscope, both like new. Best offer takes them. Fred Hartmann, 63-04 Broadway, Woodside, L. I., N. Y.

SELL—Presto cutters 1C and 1D, Decade resistance boxes, galvanometer, Log slide rule. No reasonable offers refused. Earl P. Carter, 112 Cedar Ave., Pitman, N. J.

TRADE—Hallicrafter 7" TV; Perfex "55," f2.5, 35mm; .32 spec. Winchester rifle; Solar Exameter, model CF; Triplett VOM. Want tape or wire recorder, Hickok Sweep gen., communciations rec. Edward M. Dunham, 958 Berville Rd., Allenton, Mich.

FOR SALE OR TRADE—Heathkit 5" scope, perfect, $30; Heathkit model V4 VTVM, perfect, $25; Webster-Chicago wire recorder model 80, $70; Silver Vomax, $40. Leo Liebl, Medford, Wis.

WANTED—TV and radio books. Please state what you have and price for same. Max C. Simon, 8625 - 162 St., Jamaica, L. I., N. Y.

SWAP—Rider PA manual, and vol. 17, also RCP tube checker VOM. Want 5 or 7" scope, Million test gear, code instructo, Philco scope, Rider 11, 12. M. Orange, 11 Bklyn. Av., Westbury, N. Y.

FOR SALE—BC348 P radio receiver converted to 110 volt 60 cycle a.c. Has additional audio stage with the audio and RF controls separated. Excellent working condition and just realigned. Complete with 8" PM speaker, $70 f.o.b. R. Fraim, 240 Newton Rd., Rochester 13, N. Y.

FOR SALE—Presto K8 recorder, like new, cost $368 — sell for $250. Also Shure 51 mike, $20. H. Dramen, 3938 Aragon Dr., San Diego 15, Calif.

FOR SALE—Excellent National receiver, Model NC-183, in original carton with instruction book. $240 f.o.b. Chicago. John R. Waldowski, 3511 54th Avenue, Cicero 50, Ill.

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FOR SALE—National FB-7 receiver. 5 coil sets, power supply and instruction book. Excellent shape, $20. Joseph Schneer, 1060 Ocean Ave., Brooklyn 26, N. Y.

FOR SALE—Mallory Vibrapack, 12 volts in — 300 volts 120 ma. out. Used, O.K., less vibrator, any offer. George A. Siragusa, 3015 Roberts Ave., Bronx 61, N. Y.

WANTED—One 1937 Chevrolet car radio and one 1937 Dodge radio. Must be in good condition. Richard Eikov, 453 West Broadway, Port Jefferson, New York.

WANTED—Sprague Telomike condenser tester in excellent condition. Will pay cash. State lowest price. Joseph Raisman, 1751 Georges Lane, Philadelphia 31, Pa.

TRADE—Excellent Pilot tuner FM adapter for Heith or Eico battery eliminator kit, or ? Roy Snyder, 3339 - 5th Ave. S., Minneapolis, Minn.

WANTED—Back issues "Radio Maintenance" and "Radio and TV Maintenance" magazines, from June, 1948, to current issues. State price and cond. Also Riders Vol. 18, 19, and Precision tube tester. A. Park, 121 San Mateo Ave., San Bruno, Calif.

FOR SALE—Collins ART/13, $65; pwr. supplies for Collins a.c. operation, $75; Dumont scope 274, $55; Supreme Audolizer 562, $35; Wells Gardner low freq. receiver, $21; Hallicrafter S-40, and S Meter, $55. Cecil V. Thomas, 11840 Renton Ave., Seattle, Wash.

WANTED—BC454 receiver and BC459 transmitter. Please advise price and cond. Frank Neuner, 56 Lindbergh Blvd., Bloomfield, N. J.

FOR SALE OR TRADE—Tungar bulb GE 12X825, 2 amp., in original carton, $2, or good used mike or tubes. Sahr Radio, Fairmont, Minn.

FOR SALE—BC474A receiver and transmitter, 2300kc.—6500kc., perfect cond. with tubes. P. Schwartzman, 1698 Vyse Ave., Bronx 60, N. Y.

FOR SALE—S40A Hallicrafters in excellent condition, used very little, $65. Also a Pilot FM tuner, $15. Gordon Kikkert, 548 Naylor St., Grand Rapids 9, Mich.

TRADE—8mm Mauser, made in Spain 1937 and in excellent condition, for 5" scope or Mark II transceiver in operating condition. Donald N. Anderson, 624 St. Andrew, Rapid City, So. Dak.

SWAP—New York Central Lionel Train, 7 mos. old, consists of twin diesel engine, gondola, coal car, caboose, 11 turned 3 straight tracks, one transformer. Want good tube tester. Landry's Radio Shop, 2600 Pauger St., New Orleans, La.

FOR SALE—Gen. Instr. record changer, very good, 10" and 12" records, crystal cartr., good freq. resp., permanent needle, $5. Armand Russo, 160 Sherman Ave., New York 34, N. Y.

FOR SALE—RCP Multitester model 447, $10; Twin-Trax model 710B portable tape recorder, with rev. counter, $250. Priced f.o.b., excellent condition. V. R. Hein, 418 Gregory St., Rockford, Illinois.

FOR SALE—Green Flyer phono motors, 33-1/3 $10, 78, $10, 2-speed $14; Garrard RC-60 Intermix record changer, $20; Audak X-18 pickup, $10; RCA MI-12225 amplifier, $20. All f.o.b., excellent cond. M. Phillips, 311 Penfield Pl., Rockford, Illinois.

WANTED—7" and 10" used TV receivers. State make, model, and price. Paul E. Kirkwood, 705 W. Mills St., Creston, Iowa.

WANTED—Custom built radio with panel control head for 1946 Nash "600" series sedan. New or used, will pay cash. State cond. and price. Richard Daneker, 316 E. 2nd St., Lansdale, Pa.

FOR SALE—1950 Buick auto radio, never used. Will also fit 1949 car, $50. Orig. value, $80. John's Radio Shop, 604 Charles St., Providence 4, R. I.

WANTED—General Electric YTW-1 tube checker in good condition. State price. H. J. Sudmeyer, Dover, Ark.

SELL OR TRADE—Best offer gets an ATR DC-AC inverter, hardly used. Type 6 model RSO 6V input — 110 a.c. output, 85 watts. H. Seligson, Rockland Co., New City, N. Y.

WANTED—Miles battery-operated recorder. J. A. Lawrence, Greensboro, Ala.

FOR SALE—National communication rec., six wave bands, reasonable. H. Latko, 1922 Dickens, Chicago, Ill.

FOR SALE—16" TV-Juke Box combination, $270. Oskar-Nester, 2184 Light St., Bronx 66, N. Y.

FOR SALE—Radio TV and Appliance store in small community. Owner forced to sell on account of health. TV area just opening up. Well established. Shields Radio Shop, Box 21, Roseville, Ohio.

WANTED—Leica camera and movie equipment. Have radio test equip. and parts to trade. Mathew J. Duniphin, Box 1091, Wewoka, Okla.

TRADE—Commercial and surplus electronic equip. for guns and shooting accessories. H. F. Bernard, 3670 S. W. 9th Terrace, Miami, Fla.

FOR SALE—Communication Engineering and TV Engineering magazine, complete file of all issues from September, 1947, to date. Contain many valuable technical and scientific articles. Make offer. Signal Radio, Turnerville, New Mexico.

FOR SALE—Hallicrafters SX25 Communications rec., excellent cond. Also SCR 522 in original carton, hi-freq. xmttr and rec. Both for $125 cash. H. Seitz, 89-18 Rutledge Ave., Glendale 27, L. I., N. Y.

WANTED—Cheap radios, working or not, especially small electrics. Also 1941 Hudson radio. Give complete description and price. Eldred E. Post, P.O. Box 27, Golden, Illinois.

TRADE—Superior 770; Simpson meter suitable for VTVM; battery operated sig. gen. kit; draftsmen's instruments. Want FM tuner, AM-FM tuner, or tube tester, or what have you? Carl Moore, Jr., 432 Lookout St., Warren, Penna.

FOR SALE—NRI VTVM, $5; Eico signal generator, model 315 factory built, $45. Louis Porsetsky, 5501 Snyder Ave., Brooklyn 3, N. Y.

FOR SALE—Precision E-200 sig. gen., $35; NRI tube checker, model 66, $25; Feiler signal tracer, $5; two Sunny-twin arc lamps, $15. Philip Kaston, Lake Hiawatha, New Jersey.

FOR SALE OR TRADE—Jackson 640 sig. gen., good cond., $25. Solar capacitor anal., $15, or trade for wire or tape recorder, or FM tuner. Lary Klein, 76-35 113 St., Forest Hills, N. Y.

WANTED—Capacitor analyzer, prefer C-D model No. BF-50, but any top quality instrument will be considered. State condition and price. Le Duc Radio, 5219 Courville Rd., Detroit 24, Mich.

FOR SALE—Model T-100 Revere tape recorder in excellent condition. Shipped f.o.b. for $125. Milton Kalashian, 2 Congress St., Newburyport, Mass.

TRADE—A-27 and 35mm enlarger, also RCP 447 multitester. Want communications rec., foreign stamps. Thomas R. Rohland, R D 2, Huntingdon, Pa.

FOR SALE—Webster Chicago model 156 record changer, (interchangeable heads) 78 and 33-1/3 r.p.m., $16. E. F. Vanicek, 1265 Olmstead Ave., Bronx 61, N. Y.

FOR SALE—Superior 777 set tester, Heathkit SG-1, Heathkit 03 scope, GI R-906 recorder, NRI service course, NRI comm. course, 3 - 5BPI, Heathkit V4A, Eico 315, Heath BE-2, tubes, numerous parts, 14BP4. $550 cash or make offer on any item. Marlin L. Bowser, 777 Huber St., Johnstown, Penna.

FOR SALE—U.T.C. model R-74 250 watt isolation transformer, excellent, $9 postpaid. Jim's Radio Service, 1916 Hyde Park Ave., Readville 36, Mass.

TRADE—BC458 wired and tested on 40 meter with conversion sheets and tubes. Requires 12 volt filament supply. Want 10 meter receiver or converter. Fred R. Allen, 719 Cleveland Ave., Michigan City, Indiana.

FOR SALE—Millen power amplifier, No. 90881; Globe Trotter. Power supplies and coils for above units 10-80 meters, perfect cond. Will not ship, sell personally. Rocco Champi, 6 W. Washington Ave., Atlantic Highlands, N. J.

FOR SALE—Warner electroplating outfit, excellent, 10 amp. Complete set up for electroplating baby shoes, nothing to buy. For plating metals also. $200. Write for complete list of outfit. Home Apliance Store, c/o Meryle Hansen, Box 126, Ruthton, Minn.

WANTED—Cases from burned-out U.T.C. linear standard transformers, sizes 2, 3, and 4, cast iron preferred. H. A. Rollins, 2328 Proctor Dr., Claremont Pl., Garland, Texas.

FOR SALE—Supreme model 650 oscilloscope, $48; Superior model 660 sig. gen., $50. Cash or c.o.d.. These instruments have never been used. Instructions and test leads included. Anders Radio and TV, 33 Adams St., Nelsonville, Ohio.

FOR SALE—Meissner analyzer, used once, complete with instructions, $110. C. W. Lamberts, 333 W. 29 St., N. Y. C. 1, N. Y.

SELL OR TRADE—Eico 221 VTVM, never used; Eico 315 sig. gen., factory built, never used. Sell both for $60 or trade for a generator. Leonard Cammarata, 2225 W. 5 St., Brooklyn, N. Y.

FOR SALE—7" Hallicrafters model T54 in good condition. Best offer accepted. Anthony Gazzale, Rt. 9W, West Coxsackie, New York.

WANTED—Custom magnifier for temple 7" table model. Model No. H1776. State price. Ray Jankowski, 5801 Elgin St., Pittsburgh 6, Pa.

FOR SALE OR TRADE—Vol. 6 thru 14 Sams Photofacts excellent, $100. Certified check or M. O., or trade for used but excellent 630 TS 31 tube TV chassis with all tubes including CR tube, or good communications receiver. Chuck's Radio, Box 75, Madras, Ore.

FOR SALE—Land Polaroid camera equipped with flash gun, excellent condition, $65. W. C. Ross, 38 Harkness Ave., Springfield, Mass.

TRADE—NRI Radio and TV Communication course, 78 lessons plus 9 lessons of experiments, all kits, plus the final NRI xmitter, xtal mike, all tubes. Want National NC 57 rec. in good cond. John H. Howland, Box 14, Concord, N. H.

SELLING OUT—Sylvania tube tester, Sprague Telohmike condenser tester, oscilloscope, tubes, Supreme manuels, etc. Reasonable. Send for list. R. L. Bomboy, 3429 Maple St., Progress, Harrisburg, Penna.

FOR SALE OR SWAP—For 16mm sound movie film. Zenith FM table model 7H918 receiver in good working shape. G. D. Griffin, 222 Eddy, Ithaca, N. Y.

FOR SALE—Motorola TV console 12K2, used less than one year, in perfect condition, complete with antenna and steel tower. Cash. Williamson Radio Serv., 631 W. Dallas Ave., Cooper, Texas.

FOR SALE OR TRADE—Norelco Protelgram projection unit, complete except for video chassis. $80 cash or good camera. Ralph P. Mellone, 120 Van Mara Drive, N. Syracuse, N. Y.

FOR SALE—Simpson model 303 vacuum tube voltmeter, $45; Precision E-200C sig. and marker generator, $55. Both excellent. Will ship in orig. cartons. Charles D. Hall, 5719 Forest Ave., Des Moines. Iowa.

FOR SALE—ICS radio course, complete and in excellent condition. Will sell for $50. Glenn Gaskill, 108 Buerkin Ct., Peoria, Illinois.

FOR SALE—Two 1,000' rolls of 300 ohm twinlead, never been used, $28 per roll. Edgar Lefferson, 405 S. Walnut St., Bloomington, Ind.

FOR SALE—E-200C signal generator, practically new, used a few hours. J. Sovina, 432 Beaumont St., Warrior Run, Penna.

FOR SALE—Transvision field strength meter, model FSM-1, like new, A-1 cond. G. J. Kokish, Annandale, N. J.

SWAP—Heath V.T. voltmeter, radio stethescope trouble locator, misc. transmitting and rec. tubes, etc., for stamp collection or guns. D. W. Grover, 2510 S.W. 27th Lane, Miami, Fla.

FOR SALE—Excellent Heathkit O-6 oscilloscope, assembled and working, $39.50 f.o.b., without test cables. Neatly wired. H. Sibilla, 1441 Goffe St., St. Clair, Mich.

FOR SALE—Hallicrafter receivers, models SX-28, 36, and 37. Also VT-127-A tubes. National Electric Mfg. Co., 1107 Sheffield Ave., Niles, Mich.

SELL OR TRADE—Have Radio News, Popular Photography, Popular Mechanics, Pageant, and many other interesting and rare magazines. Want 16mm silent film or Sam's radio and electronic books. Send your list for mine. Louis Leibovitz, 3835 Cambridge St., Philadelphia 4, Pa.

FOR SALE—Weston DB meter model 695 type 11 20,000 ohm constant impedance rectifier. Ammon Radio, 50 Russ St., Hartford, Conn.

WANTED—Portable mobile sound system to operate on auto 6 volt battery or electric power a.c. 110 volts. Advise condition, watts, accessories, and price. H. C. Morris, Shenandoah, Va.

WANTED—Good used McMurdo Silver model 802 ham-band receiver. Paul Curtis, 128 W. Terra Alta, San Antonio 9, Texas.

WANTED—Complete set of Sam's Photofacts. Have TV booster, TV parts, Simpson 260 meter, and tubes to trade, or cash. State price. Alexander Service Co., 1801 McConnell Rd., Greensboro, N. C.

FOR SALE—Three Eimac 100th and two RCA 211 tubes. Need 4D32 tubes. M. G. Wheeler, 1531 Catalpa St., Louisville 11, Ky.

SELL OR TRADE—Type 164 Dumont scope in good condition with new spare CRT, $40. Or swap for Rider Manuals 18 and 19. W. Boudreaux Box 1833, Berwick, La.

WANTED—A job as a radio repair man or electrician. Graduate of National Radio Institute. 10 years of radio repair experience, 4 years as Marine electrician. New England area preferred. Albion W. Gamage, So. Bristol, Me.

FOR SALE—Rider Manuals, 1 to 11 inclusive, new condition. R. B. Brown, 6055 Gloucester St., Los Angeles 22, Calif.

WANTED—16mm motion picture camera, sound projector, lenses and editing equipment. Cash or following to trade: 1938 Dodge panel, Underwood portable typewriter, 35mm camera, 3¼ x 4¼ Graflex type camera, 1/3 h.p. GE motor. Martin M. Davison, 83 Pinewood Ave., Albany N. Y.

WANTED—Rider Manuals. State condition and price. Sadler Radio, 15 S. First, Clayton, New Mexico.

TRADE OR SELL—Supreme signal gen., tubes, wind charger and radio, misc parts. Will trade lists. Want photographic material. M. L. Heineken, 3328 - 49th Loop, Sandia Base, Albuquerque, New Mexico.

FOR SALE OR TRADE—Gardiner electric code sender with ten tapes, like new, $19; adjustable a.c. code oscillator with speaker, $6.00. Will trade on or for a VFO or complete 10-meter beam. Philip Snyder, Pine St., Nelsonville, N. Y.

SELL OR TRADE—Weston 772 VOM; Rider Manuals; Silver Masterpiece IV; National NC-44; Zenith Trans-oceanic port.; other items. Want Super-Pro, not necessary to be complete or in operating condition. Also TV set, or what? Glenn Watt, 415 W. First, Chanute, Kans.

FOR SALE—National HFS receiver-converter with 115 V. power supply, continuous range 27-250 Mc., $125. Also 250 W. 10 meter pp T55 final with TZ40 modulators, $60. P. Boothroyd, Sunnyside Trailer Park, R. D. 1, Norristown, Pa.

WANTED—Connectors, AN or UG, Amphenol or other makes. Any quantities. State prices. Franklin Company, 319 Broadway, New York 7, N. Y.

FOR SALE—Supreme sig. gen. and freq. modulator, model 581; Supreme oscilloscope, model 535; Superior X-rayometer, VOM Cap.; Superior channel analyzer; Hickok model T-53 dynamic mutual conductance tube tester. Best offer. Robert Bilek, 10407 Grandview Avenue, Cleveland 4, Ohio.

FOR SALE—Rider Manuals, 1, 2, 3, 4, 1-5 abridged, 6, 7, 8, 9, 10, 11, 12, 13, and 14, excellent condition, complete with indexes, $100 f.o.b. Pittsburgh. Veto M. Twaska, 3105 Bergman St., Pittsburgh 4, Pa.

FOR SALE—Model C-1708 Philco auto radio, complete in excellent condition, dash board type one unit, $10 c.o.d. V. Kozma, 1665 Stadium Av., N. Y. 61, N. Y.

WANTED—Hallicrafters S-38 receiver. Will pay cash or trade for items. Send particulars. Eugene Kon, 1575 Broadway, Buffalo 12, N. Y.

SWAP OR SELL—Riders 1-5 abridged, with index, perfect condition, never used, $15, cash. Or swap for good .22 revolver or automatic, tubes, '42 to '48 Chevrolet de luxe auto radio, or? C. Elgasser, Jr. 1920 Fern St., San Diego, Calif.

FOR SALE—Hallicrafters S-40 receiver, perfect condition, $60 f.o.b., or best offer. Set of spare tubes, $5. Or what have you? Matt. H. Klapp, 17 Kenosha St., Albany, N. Y.

SELL OR TRADE—LP record changer, Casco tool kit, Deforest multimeter, Fada FM tuner, J. J. Mrofchak, R. 4, Lapeer, Mich.

SELL OR TRADE—Have a GE 10BP4 and a deflection yoke RCA 201D1-600. Best cash offer, or what have you? L. Schneider, 1315 West 7th St., Brooklyn 4, N. Y.

FOR SALE OR TRADE—Radio City signal generator, model 705, good shape, $25 f.o.b. Want Riders above 14, cameras, or? G. R. Calvert, Box 637, Auburndale, Fla.

SWAP—Want TV chassis for 16RP4 tube and cabinet any cond. Send your lists. Ben's Radio and TV, No. Tonawanda 2, N. Y.

SALE—Motorola Airboy Sr. Receives 200-400 kc., transmits 3105 kc., complete with xtal, mic-phones. Rebuilt by factory, uses dry batteries, $25. Bell & Howell 16mm diagonal film splicer, perfect, $3. Hal Magargle, 790 Garrett Rd., Upper Darby, Pa.

FOR SALE—Rider Manuals, vols. 1 to 11 inclusive, also volume 13, $85. Stephen Kalista, 119 E. Ridge St., Coaldale, Pa.

WANTED—Ship to shore phone, 6 volts. State condition and price. Ben Gordon, 15 No. Mac Questen Pky., Mt. Vernon, N. Y.

WANTED—Light plant 110V a.c. and 6 or 12V d.c., weight less than 100 lbs. — for cash or trade 2 Presto K disc recorders in good condition. Herbert Hoch, 418 E. 53rd St., Brooklyn 3, N. Y.

WANTED—Schematic for Freed-Eisemann model 355 radio. This is not the set shown in Riders Manual No. 4, but is an earlier model using six hole sockets throughout. Will pay $2 for diagram. Dubin Radio Service., 821 Brewster St., Bridgeport Conn.

FOR SALE OR TRADE—Eico VTVM factory wired in good condition, $20, or trade for a good tube tester. H. Glovin's Radio Serv., 50 Rush St., Brooklyn 11, N. Y.

WANTED—Information on automatic telephone answering and recording equipment. Wish to buy complete or build. Ray. Bartlett, 106 Thomas Place, Yonkers 2, N. Y.

WANTED—Zenith trans-oceanic portable. Have complete NRI radio and TV course just like new. Best offer. Mr. D. M. Zellner, 125 So. 7th St., Easton, Pa.

FOR SALE—Dumont TV set, model TV12; National NC-240 receiver; tape recorder. H. Latko, 1922 Dickens, Chicago, Ill.

SWAP—Model RT-50 Bell portable tape recorder, extra tapes; underwood noiseless typewriter; micro 16mm camera and case. Want good ham receiver and/or accessories. Bill Montville, 314 Second St., Angola, Ind.

SWAP—Remington noiseless typewriter, office size. Want VTVM or other radio equipment. C. Gabler, 1307 Merriam Ave., New York 52, N. Y.

WANTED—Aerovox L-C Checker. State price or your needs. James H. Gentry, 212 Loockerman St., Dover, Del.

FOR SALE—One 810 tube, never used, $5 plus postage. Preston L. Williams, 415 Liberty St., So. Norfolk 6, Va.

SELL—Precision E-200C sig. gen., perfect condition, $36. Benjamin Gordon, 290 Pennsylvania Ave., Brooklyn 7, N. Y.

SWAP OR SELL—Meissner model 8 C FM receptor, used only few times. Want mobile ham gear. C. E. Metzger, P. O. Box 1314, Lake Charles, La.

FOR SALE—American dynamic mike and desk stand, $9 f.o.b.; Webster 80 wire recorder, $75 f.o.b. Excellent condition. M. Phillips, 311 Penfield Place, Rockford, Ill.

FOR SALE—Hallicrafters S-38 communication receiver, excellent condition, best offer above $26 takes it. John P. Eicher, 2701 5th Ave., Council Bluffs, Iowa.

WANTED—0A5 miniature cold cathode trigger tube. State price and condition. William Hulstrunk, 139 Halsted St., East Orange, N. J.

FOR SALE—NRI complete Radio and TV course in perfect condition. Best offer. David Friedman, 1562 E. 16th St., Brooklyn 30, N. Y.

FOR SALE—Parmetal rack, 19" panels 36" high, $12. Also Pilot FM tuner, $12. D. Tinnerello, 238 East 123 St., New York 35, N. Y.

WANTED—Two 7" TV sets in good cond., Motorola or Admiral. State price or trade items wanted. D. & M. Radio Service, 434 Carsonia Ave., Reading, Pa.

FOR SALE—RCA 630TS and RCA 8TS30 TV receivers. Both in excellent working condition, and cabinets are like new. Best offer. Leo Stolove, 505 Rockaway Parkway, Brooklyn 12, N. Y.

WANTED—2" Waterman Pocketscope. Also Supreme signal generator, model 661. Leo W. Brandt, Box 113, The Heights, Mich.

SWAP—Model G-5 Heathkit sig. generator, never used, perfect. Want VTVM, plus cash if necessary. Herb Senie, Inwood Sta., N. Y. C. 34, N. Y.

FOR SALE—Complete file of Communications and TV Engineering magazine from Sept., 1947, to date. Make us an offer. Signal Radio Service, Turnerville, New Mexico.

FOR SALE—NRI tube tester, 2 years old, made by Triplett, complete with latest manual, $30. Eugene C. Linderkamp, 703 N. Johnson St., Charles City, Iowa.

TRADE—Weston model 798 type 3RI tube tester for 16mm sound projector in good condition. William Lazonick, 128 Spring St., Passaic, N. J.

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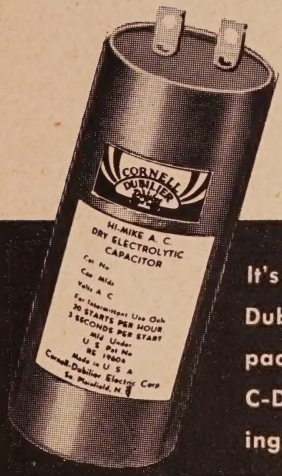

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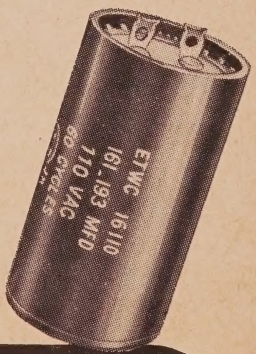

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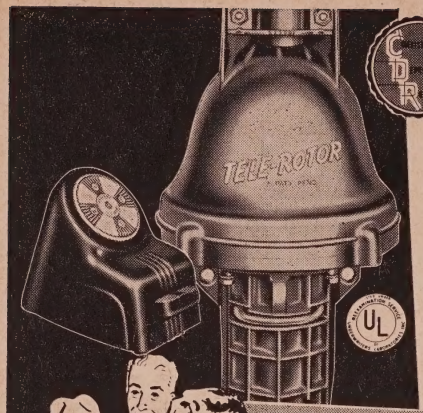

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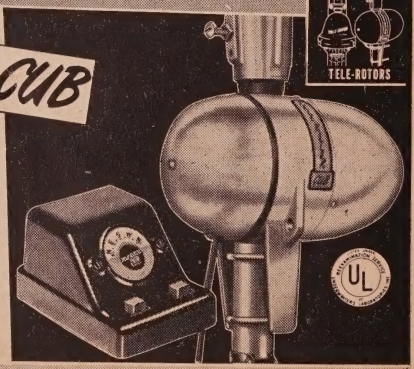

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